CLAIMS

1. A process for forming nanostructures comprising the step of applying on localised regions of a smooth thin film of bistable or multistable molecules an external perturbation with preset magnitude thereby said film undergoes a collective morphological transformation and nanostructures are formed by selforganisation of said molecules, said nanostructures having preset number, size, interspacing and shape.
2. A process according to claim 1, wherein said nanostructures are in the form of dots when said regions are one-dimensional and said nanostructures are in the form of strips when said regions are two-dimensional.
3. A process according to claim 2, wherein said dots are formed with a density, inter-dot distance or pitch and size controlled by presetting a thickness of said thin film.
4. A process according to claims 2 or 3, wherein said dots are formed in a number controlled by presetting a length of said regions.
5. A process according to claim 1 wherein the nanostructures are organised in the form of arrays of nanostructures.
6. A process according to claim 2 wherein said dots are formed and used to code and store information with areal densities of 1-1000 Gbpsi.
7. A process according to claim 1 wherein said perturbation is selected from a mechanical perturbation, a thermal perturbation, a thermo-mechanical perturbation, an electrical perturbation, a magnetic perturbation, a perturbation made with light or combinations thereof.
8. A process according to claims 1 or 2 wherein said perturbation is applied with a scanning probe microscope (SPM).
9. A process according to claims 1 or 2, wherein the perturbation is applied with mechanical devices, millipedes or actuators able to produce multiple local perturbations.

10. A process according to claims 1 or 2 where in said perturbation is applied with an optical microscope, or related system, a scanning confocal microscope, or photolithography setups.

11. A process according to claim 1 wherein said perturbation is applied with a rigid stamp or with a flexible stamp with which a load force is applied on said film regions, said load force being in the range of 0.1 to 100 kg/cm^2.

12. A process according to claim 1, wherein said morphological transformation of said thin film is obtained by wetting/dewetting transition, dewetting introducing spatial correlation, particularly spinodal dewetting, crystallisation or formation of intermediate metastable structures.

13. A process according to claim 1 wherein said molecules are selected from the group consisting of rotaxanes, partcularly rotaxane 3, and rotaxanes terminated with optically /electrically active groups and conjugated stoppers.

14. A process according to claim 1 wherein said molecules are selected from the class of catenanes.

15. A process according to claim 1, wherein said molecules are selected from molecules having an isomerizable double bond, particularly molecules containing a linear C=C bond with cis-trans isomerisation, azo e diazo groups.

16. A process according to claim 1, wherein said molecules are selected from molecular motors and actuators and biological motors, particularly actine, miosine, oligopeptides, DNA, RNA and oligonucleotides.

17. A process according to claim 1 wherein said thin film is deposited on a substrate or is grown on a substrate form solution, or from vapour phase, or from reactive precursors, or by sublimation.